REMARKS/ARGUMENTS

Applicant has amended claims 24, 68, 90, 91, 112, 113, 134 and 137 to further clarify the invention. Applicant has canceled claims 35, 67, 89, 11, 133, 138 and 142.

The Examiner rejected Claims 24-26, 33-36, 44-67, 73, 78-81, 87-89, 95, 100-102, 109, 110, 122-124, 131, 132 and 140-142 under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The Examiner rejected the above-referenced claims because, according to the Examiner, the following elements were not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the invention was filed, had possession of the claimed invention:

a) at least a portion of the iron bearing material fluxes the ash slag to produce a composite ash slag having at least one ash fusion temperature characteristic selected from the group consisting of initial deformation temperature, softening temperature, hemispherical temperature, and fluid temperature less than the same ash fusion temperature characteristic of the ash slag produced from combustion of the solid fuel alone as required in Claims 24, 87, 109, 131, and 140-142;

b) at least one carbon compound as required in Claims 57, 58, 78, 79, 100, 101, 122, and 123;

c) a particle size reduction and reducing the particle size as required in Claims 52, 59, 73, 80, 95, 102, and 124;

d) ash fusion temperature characteristic is less than 2600°F as required in Claims 66, 88, 110, and 132, and initial deformation temperature, softening temperature, hemispherical temperature, and fluid temperature less than 2600°F as required in Claims 66, 88, 110, and 132;

e) the iron bearing material fluxes the ash slag to produce the ash slag as required in Claims 33, 68, 90, and 112;

f) the melting point of the composite ash slag is less than 2600°F as required in Claims 36, 66, 88, and 132; and

g) the at least one ash fusion temperature characteristic is fluid temperature as required in Claim 45.

THE LEGAL REQUIREMENTS UNDER SECTION 112, FIRST PARAGRAPH

The Examiner bears the burden of establishing a prima facie case why persons skilled in the art would not recognize in the specification disclosure a description of the claimed invention.

Section 112, first paragraph, requires, *inter alia*, that the specification shall contain a written description of the invention, and of the manner and process of making and using it so as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the invention.

The Examiner bears the burden of providing the prima facie case to support the rejection of any application. As stated by the Board of Patent Appeals and Interferences, "the examiner has the initial burden of presenting evidence or reasons why persons skilled in the art would not recognize in [the] specification disclosure a description of the invention defined by the claims. *Ex Parte Sorenson*, 3 USPQ2d 1462, 1463 (B.P.A.I. 1987). The Federal Circuit has stated that "the test for sufficiency of support in a parent application is whether the disclosure of the application relied upon 'reasonably conveys to the artisan that the inventor had possession at that time of the later claimed subject matter." *Ralston Purina Co. v. Far-Mar-Co, Inc.*, 772 F.2d 1570, 227 USPQ 177 (Fed. Cir. 1985).

"Upon reply by applicant, . . . [the examiner is required to] fully respond to applicant's rebuttal arguments, and properly treat any further showings submitted by applicant in the reply. When a rejection is maintained, any affidavits relevant to the 35 U.S.C. 112, para. 1, written description requirement, must be thoroughly analyzed and discussed in the next Office action." MPEP§2163.02.

The specification need not literally recite a claim limitation for a claim to satisfy the requirements of Section 112, first paragraph.

"It is not necessary that the application describe the claim limitations exactly . . . but only so clearly that persons of ordinary skill in the art will recognize from the disclosure that appellants invented processes including those limitations." *In re Wertheim*, 541 F.2d 257, 191

USPQ 90, 96 (C.C.P.A. 1976). "Satisfaction of the 'written description' requirement does not require in heac verba antecedence in the originally filed application." *Staehelin v. Secher*, 24 USPQ2d 1513 (B.P.A.I. 1992). In *Ex parte Parks*, the Board further elaborated:

> Adequate description under the first paragraph of 35 U.S.C. 112 does not require *literal* support for the claimed invention . . . Rather, it is sufficient if the originally-filed disclosure would have conveyed to one having ordinary skill in the art that an appellant had possession of the concept of what is claimed.

Ex parte Parks, 30 USPQ2d 1234 (B.P.A.I. 1994) (emphasis in original).

"While there is no *in haec verba* requirement, newly added claim limitations must be supported in the specification through express, *implicit,* or *inherent* disclosure." MPEP § 2163(I)(B) (emphasis supplied.); *see, e.g.,* MPEP § 2163.02. Morever, the U.S. Court of Appeals for the Federal Circuit in *Eiselstein v. Frank*, 52 F.3d 1035,1038 (Fed. Cir. 1995), reviewed the need for literal support for claim language in the specification and stated:

> In order to determine whether a prior application meets the "written description" requirement with respect to later-filed claims, the prior application need not describe the claimed subject matter in exactly the same terms as used in the claims; it must simply indicate to persons skilled in the art that as of the earlier date the applicant had invented what is now claimed. . . . The test is whether the disclosure of the application relied upon reasonably conveys to a person skilled in the art that the inventor had possession of the claimed subject matter at the time of the earlier filing date (citing *Vas-Cath Inc. v. Mahurkar*, 935 F.2d 1555 (Fed. Cir. 1991) and *Ralston Purina Co. v. Far-Mar-Co, Inc.*, 772 F.2d 1570 (Fed. Cir. 1985)) (internal citations omitted).

By way of illustration, "where no explicit descriptions of a generic invention is to be found in the specification . . . mention of representative compounds may provide an implicit description upon which to base generic claim language." MPEP § 2163(I)(B)(3)(b) (quoting *In re Smith*, 458 F.2d 1389, 1395, 173 USPQ 679, 683 (CCPA 1972). By way of further example, "[b]y disclosing in a patent application a device that inherently performs a function or has a property, operates according to a theory or has an advantage, a patent application necessarily discloses that function, theory or advantage, *even though it says nothing explicit concerning it.*" MPEP § 2163.07(a) (emphasis supplied.) "The application may later be amended to recite the

function, theory, or advantage without introducing prohibited new matter." MPEP § 2163.07(a). Inherent properties which do not constitute new matter are those which would be obvious to one skilled in the art from the very nature of the material. *Kennecott v. Kyocera*, 835 F.2d 1149 (Fed. Cir. 1987) (parent application contained adequate support for later filed CIP application's new disclosure of microstructure of ceramic particle where only ceramic particle, and not its microstructure, was described in parent application); Ex *parte Ayers, et al.*, 108 USPQ 444 (POBA 1955); *see, e.g., In re Nathan, et al.*, 328 F.2d 1005, 140 USPQ2d 601 (CCPA 1964) (stereoconfiguration of a compound is not new matter); *Ex parte Davisson, et al.*, 133 USPQ 400 (POBA 1958) (physical properties of a compound, e.g., optical rotation data and elemental analysis of a disclosed salt, are inherent properties of a compound which can be added to the disclosure after filing); *In re Bowden et al.*, 183 F.2d 115, 86 USPQ 419 (CCPA 1950) (since chemical reactions are frequently unpredictable a specification may be amended at the proper time to supply corrected data subsequently discovered or which is implicit in the application as filed); *Tektronix, Inc. v. United States, et al.*, 165 USPQ 392 (Ct. Cls 1970).

> Claimed subject matter that is not explicitly disclosed in the specification but is disclosed inherently by the specification satisfies Section 112, first paragraph.

Indeed, unstated subject matter satisfies the written description requirement when it is inherently disclosed in the specification. In *In re Smythe*, the court stated:

> *By disclosing in a patent application a device that inherently performs a function, operates according to a theory, or has an advantage, a patent applicant necessarily discloses that function, theory or advantage even though he says nothing concerning it.* The application may later be amended to recite the function, theory or advantage without introducing prohibited new matter.

In re Smythe, 480 F.2d 1376, 178 USPQ 279, 285 (C.C.P.A. 1973) (emphasis supplied).

"To establish inherency, the extrinsic evidence 'must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of

circumstances is not sufficient.'" MPEP§2163(I)(B)(3)(b) (quoting *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999); *see also* MPEP § 2163.07(a).

Thus, lack of literal support for specific claim terms is not enough to support a rejection under 35 U.S.C. § 112 where one of skill in the art would understand from the disclosure that the inventors had possession of the invention, as claimed, at the time of filing. The declarations of Dr. Bisque (Bisque Declaration) and Dr. Durham (Durham Declaration), both filed July 29, 2004, are evidence of precisely this understanding by one skilled in the relevant art. The Examiner cannot discount the statements of Dr. Bisque by simply stating that the declaration is unpersuasive. The MPEP requires more. The Examiner needs to provide factual reasons explaining why the declaration is not persuasive; that is, why it fails to establish why one of ordinary skill in the art would not reasonably conclude that the inventor had possession of the claimed invention. This the Examiner has failed to do. In fact, the Examiner seems to acknowledge that the declaration is sufficient under the law by stating that the applicant is relying on "inherency" to justify the support of the claims under 35 U.S.C.§112, first paragraph. As noted above, "inherency" establishes compliance with the written description requirement.

Nonetheless, applicant will summarize the contents of the declarations and revisit, in view of the above statement of the law, why the above assertions of the examiner are incorrect.

DISCUSSION OF THE 35 U.S.C. 112 REJECTIONS

The Examiner's assertion that there is no support in the Specification for the limitations that at least a portion of the iron bearing material fluxes the ash slag to produce a composite ash slag having at least one ash fusion temperature characteristic selected from the group consisting of initial deformation temperature, softening temperature, hemispherical temperature, and fluid temperature less than the same ash fusion temperature characteristic of the ash slag produced from combustion of the solid fuel alone (Claims 24, 87, 109, and 131) and the at least one ash fusion temperature characteristic is fluid temperature (Claim 45).

Claim 24 requires at least a portion of the iron bearing material to flux the ash slag to produce a composite ash slag having at least one ash fusion temperature characteristic selected from the group consisting of initial deformation temperature, softening temperature, hemispherical temperature, and fluid temperature less than the same ash fusion temperature characteristic of the ash slag produced from combustion of the solid fuel alone. Claims 87, 109, and 131 each require, during the combustion of the solid fuel in the presence of the iron-bearing material, that at least one ash fusion temperature characteristic selected from the group consisting of initial deformation temperature, softening temperature, hemispherical temperature, and fluid temperature be less than the same ash fusion temperature characteristic of an ash slag produced from combustion of the solid fuel alone. Claim 45 requires the at least one ash fusion temperature characteristic of Claim 24 to be fluid temperature.

> The claimed invention and Shepard, Jr., et al., use the same reactants under the same reaction conditions in the same reactor to produce the same result, namely the production of a slag having a lower viscosity than a slag produced by combustion of coal alone.

Before responding to the Examiner's rejections, it is important to understand the overlap between the claimed subject matter of Shepard, Jr. et al., and the present application ("the Subject Application") and U.S. Provisional Application 60/213,915, filed June 26, 2000 ("the Provisional Application"), which was incorporated by reference in its entirety in the Subject Application. They each disclose the combustion of the same fuel in the same type of combustion chamber in the presence of the same iron-bearing material additive under the same temperature regime. The fuel is a low sulfur western or eastern coal (*see, e.g.,* Provisional Application at pages 1 and 3; Subject Application at Figure 2, page 2, lines 15-17, page 3, lines 9-12, page 4, lines 3-4 and 7-9, and page 6, lines 4-5; and Shepard Patent at col. 1, line 62-col. 2, line 3, col. 3, lines 26-34 and 55-57and Fuels 3 and 4). The combustion chamber is a "slag tap" or "wet bottom" boiler, such as a cyclone-type boiler (*see, e.g.,* Provisional Application at pages 1-5 and 7-8; Subject Application at Figure 1, page 1, lines 18-26, page 5, lines 16-17, page 6,

lines 4-5 and 15-18, and page 18, lines 12-13; and Shepard Patent at col. 2, lines 7-8, col. 4, lines 7-10). The iron-bearing material is mill scale from steel production or dust from blast furnace gas cleaning equipment (*see, e.g.,* Provisional Application at pages 4 and 6; Subject Application at page 12, lines 7-12; and Shepard Patent at col. 4, lines 15-16, col. 8, lines 4-5). The temperature regime is that necessary to combust the solid fuel and melt the ash content of the fuel to form slag. (*see, e.g.,* Provisional Application at pages 1-5 and 7-8; Subject Application at page 2, lines 14-15, page 6, lines 4-5 and lines 15-18, Figures 7-8 and page 20, lines 1-21; and Shepard Patent at col. 2, lines 4-50, col. 5, lines 10-50). In chemistry, it is elementary that the use of the same reactants under the same reaction conditions in the same reactor will produce the same results. (Declaration of Ramon Bisque filed July 29, 2004, at ¶8 (Bisque Declaration). This conclusion is consistent with the teachings of Shepard et al., and the subject application. Regarding the results from adding the iron-bearing material, Shepard et al. and the subject application *both* teach that the iron-bearing material fluxes the ash formed from the solid fuel, thereby causing the slag to have a lower viscosity than a slag produced by combustion of the coal alone. (Shepard et al. at col. 2, lines 42-47 and lines 58-61; col. 4, lines 22-25; col. 5, line 51-col. 6, line 10; col. 6, lines 52-56; col. 6, line 60-col. 7, line 9; col. 7, lines 43-47; col. 7, lines 57-63; col. 8, lines 7-13; col. 9, lines 21-26; col. 9, lines 56-60; col. 9, line 66-col. 10, line 26; col. 10, lines 52-54; and claim 5; Subject Application at page 18, line 10; page 5, lines 13-17; page 6, lines 19-22; page 7, lines 15-22; page 8, lines 9-10; page 9, lines 14-15; and page 20, lines 1-19).

While applicants use melting point to measure the effect of fluxing by the iron-bearing material, Shepard et al. uses ash fusion temperature characteristics. For western coals, a reduction in melting temperature necessarily equates to a reduction in an ash fusion temperature characteristic. (Bisque Declaration at ¶18.)

<u>Each of the Ash Fusion Temperature ("AFT") characteristics is synonymous with a melting temperature of an ash constituent.</u>

One method of determining the different AFT characteristics corresponding to the melting temperature of the ash is set forth at pages 20-5 through 20-7 of *"Steam/its generation*

and use", by Babcock & Wilcox (1972) ("the Babcock & Wilcox Article" attached to the Bisque Declaration, in which the AFT properties are determined as part of the ASTM Standard D 1857, *Fusibility of Coal and Coke Ash*.") According to the standard, an ash sample is prepared by burning coal under oxidizing conditions at temperatures of 1470 to 1650° F. The ash is pressed into a mold to form a triangular pyramid cone 0.75 in. in height with a 0.25 in. triangular base. The cone is heated in a furnace at a controlled rate to provide a temperature increase of 15° F per minute. The initial deformation temperature (IT or ID) refers to the temperature at which the tip of the pyramid begins to fuse or show signs of deformation. The softening temperature (ST) is the temperature at which the sample has deformed to a spherical shape where the height of the cone is equal to the width at the base (H=W). The softening temperature is commonly referred to as the fusion temperature. The hemispherical temperature (HT) is the temperature at which the cone has fused down to a hemispherical lump and the height equals one half the width of the base (H=1/2W). The fluid temperature (FT) is the temperature at which the ash cone has melted to a nearly flat layer with a maximum height of 0.0625 in. (*See* Bisque Declaration at ¶14.)

It is well known that each of the AFT characteristics, namely IT, ST, HT, and FT, represent a melting point of one or more ash constituents. Regarding the relationship between the AFT properties and the melting point of the ash, the Babcock & Wilcox Article states:

> The gradual deformation of the ash cone is generally considered to result from differences in melting characteristics of the various ash constituents. As the temperature of the sample is increased, compounds with lowest melting temperature begin to melt, causing the initial deformation. As the temperature continues to increase, more of the compounds melt and the degree of deformation proceeds to the softening and hemispherical stages. The process continues until the temperature is higher than the melting point of most of the ash constituents and the fluid stage is reached.

(The Babcock & Wilcox Article at page 20-6.) (Bisque Declaration at ¶15.)

Thus, Babcock states that each of the AFT characteristics correspond to a melting point of an ash constituent and that the melting point of the ash is necessarily a function of the various melting points of the ash constituents.

The Provisional and Subject Applications' use of the term "melting temperature" represents a decrease in viscosity rather than a distinct melting point.

Regarding the Specification's statement that the iron bearing material lowers the melting temperature of the slag, one of ordinary skill in the art would construe this to mean that the viscosity is lowered by the additive. A commentator has stated as follows:

> There are not distinct melting points for coal ash like with ice or other pure compounds, *so when melting is mentioned it is used to represent a decrease in viscosity, rather than a melting point*. When coal ash melts it occurs on both a large scale and a microscopic scale. . . . As the temperature of the material increases, its viscosity decreases. . . . On a microscopic scale several minerals may have all ready melted, but their concentrations are low when compared to other minerals with higher melting temperatures.
>
> The ASTM Fusion Temperature Test is a documented observation of this process occurring in coal ash shaped like a small cone, and placed in a furnace with increasing temperatures. The initial deformation temperature, ID, is usually a hundred or more degrees above where the first low melting temp. minerals start to melt. The remaining fusion temperatures represent an ever increasing amount of molten material, and a lowering of viscosity of the glass like material. It should be noted that even at the fluid temp. there may be solid or non-melted minerals such as quartz.

Rod Hatt, *Coal Properties, Sampling & Ash Characteristics*, Coal Combustion, Inc. (Attached hereto as Exhibit "A") (Emphasis supplied.).

The Provisional and Subject Applications' use of the terms "flux" and "fluxing agent" conveys to one of ordinary skill in the art that the various melting points of the ash consituents, denoted by the AFT properties, are lowered by the iron-bearing additive.

Regarding the AFT-characteristic limitation and the fluxing limitation, namely that the "iron bearing material fluxes the ash slag" in claims 1, 11, 19, 24 and 33 (*see* Office Action at pages 3, 4, 5, and 33), the Provisional and Subject Applications further use the term "flux" and "fluxing agent". (Provisional Application at pages 1, 3-4, and 6-8 and Subject Application at page 5, lines 13-14, page 6, lines 19-22, page 8, lines 10-11).

The Subject and the Provisional Applications each state that the iron-bearing additive fluxes the ash and lowers the melting temperature of the ash. *See e.g.* Provisional Application at page 3, "[i]t is the use of these byproducts of steel and iron manufacturing to *flux the ash* and improve the cyclone operation that is new and unique" and at page 1 "[t]he iron both reduces the melting temperature of the ash, and reduces the slag viscosity at these temperatures due to the presence of iron aluminosillicate crystals in the ash." (Emphasis added). *See e.g.* Subject Application at page 6, lines 19-22, "[t]he iron-containing additive can be in any form and any composition so long as iron is present in sufficient amounts *to flux effectively the feed material*" (emphasis supplied) and page 7, lines 15-18 "...it is believed that the presence of iron in the calcium aluminosilicate slags of western coals causes a decrease in the melting temperature of the ash and crystal formation in the melt when a critical temperature (T_{CV}) is reached." *See also* page 5, lines 13-14 page 8, lines 10-11, Figs. 7-8 and page 20, lines 1-21 of the Subject Application. According to *Hawley's Condensed Chemical Dictionary*, "flux" is defined as "[a] substance that promotes fusing of minerals or metals or prevents the formation of oxides." It further defines "fuse" as "[o]f a solid, to *melt*, e.g., a fused salt." (Emphasis supplied.)

The terms "flux" and "fuse" would further suggest to one of ordinary skill in the art that the various melting points of the ash constituents, denoted by the AFT properties, are lowered by the iron-bearing additive disclosed in the Provisional and Subject Applications. (Bisque Declaration at ¶17.)

> <u>The Provisional and Subject Applications' statement that the iron-containing additive lowers the T_{250} of low-sulfur coals conveys to one of ordinary skill in the art that the various melting points of the ash consituents, denoted by the AFT properties, are lowered by the iron-bearing additive.</u>

The Provisional and Subject Applications further refer to the iron-containing additive lowering the T_{250} (or the temperature at which the ash would have a viscosity of 250 poise and is an important indicator for the minimum temperature at which the slag will flow) for low-sulfur eastern and western coals having low iron and high calcium contents. (Provisional Application

at pages 1 and 4-5 and Subject Application at Figure 2, page 2, lines 15-17, page 7, lines 15-18, page 9, lines 14-15, page 19, lines 5-10, Figures 7-8 and page 20, lines 3-21). As shown in Figures 7-8 of the Subject Application, the iron-containing additive lowers the slag viscosity, at temperatures above about 2275°F, compared to a slag when no additive is used. It is inherent that the use of the iron-bearing material to lower the T_{250} of low-sulfur coals having low iron and high calcium contents and having low iron and high calcium contents will lower each of the AFT properties referenced above. (Bisque Declaration at ¶¶18 and 20.) Shepard, et al. is directed to combustion of low-sulfur coals having low iron and calcium (lower basicity) (col. 3, lines 19-34; col. 7, lines 42-56; Table I; and Fig. 3) in the presence of the iron-containing additive to reduce viscosity (i.e. AFT characteristics) (col. 7, line 57; col. 8 line 6).

<u>The Subject and Provisional Applications each state that the iron-bearing additive fluxes the ash and lowers the ash melting temperature, which statements are alternate expressions for and inherently state that the additive lowers the fluid temperature of the AFT characteristics.</u>

As noted above, the Specifications of the Subject and Provisional Applications literally state that the iron-bearing additive fluxes the ash and resultingly lowers the melting temperature of the ash. The AFT characteristics are simply an alternate way of expressing ash melting temperature and viscosity in the same manner that inches and centimeters are alternative measures for length. As set forth in the Declaration of Dr. Ramon Bisque under 37 CFR § 1.132 ("Bisque Declaration"), attached hereto as Exhibit A, which was submitted in the previous Office Action Response of July 29, 2004, the AFT characteristics of initial deformation temperature, softening temperature, hemispherical temperature, and fluid temperature represent a *continuum of constituent melting points* leading to the *ultimate* melting temperature of the ash. (*See* Bisque Declaration at ¶13.) One of ordinary skill in the art would understand the phrase, "melting temperature of the ash" (as used in the Subject and Provisional Applications), to refer to the last (or highest) of a sequence of melting points for differing ash constituents and require that each of

the lower melting point constituents have melted. The melting temperature of the ash is therefore synonymous with the fluid temperature. (Bisque Declaration at ¶16.)

> Shepard, Jr., et al., admits that lowering the AFT characteristics in low sulfur coals will necessarily lower the viscosity by adjusting the base-to-acid ratio of the coal.

Shepard, Jr., et al., the patent for which Applicants are requesting declaration of an interference, admits that the AFT characteristics are simply a way of measuring the ash viscosity, which, as admitted by Hatt, is proportional to the melting point or temperature of the ash. Shepard, Jr., et al., admits that slag tap boilers require ash having low AFT characteristics. (Col. 5, lines 51-58.) They admit that lower sulfur coals generally have ash chemistry and AFT characteristics that are outside the range for which slag tap or cyclone boilers were originally designed because lower sulfur coals have higher AFT characteristics (i.e., higher IDT, ST, HT, and FT) than is desirable for proper ash flow from the bottom of the boiler. (Col. 3, lines 19-34.) They admit that adding suitable amount of iron-bearing material to low sulfur coals with high AFT characteristics will adjust the base-to-acid ratio and ultimately the ash viscosity characteristics to render the low sulfur coals suitable for use in slag tap boilers because the iron-bearing material will adjust the iron content of the slag to more closely resemble that characteristic of coal having low AFT characteristics. (Col. 7, lines 47-56, and col. 9, lines 21-30, and col. 10, lines 21-26.)

Accordingly, based on Shepard, et al., the present application's disclosure that the iron-containing additive lowers the viscosity and melting temperature of low sulfur coal and acts as a fluxing agent would necessarily disclose to one of ordinary skill in the art that the iron-containing additive lowers the AFT characteristics of the low sulfur coal.

> The Examiner's assertion that there is no support in the Specification for the requirement that the iron-containing additive include at least one carbon compound(Claims 57-58, 78-79, 100-101, and 122-123)

Claims 57-58, 78-79, 100-101, and 122-123 requires the iron-bearing material to contain at least one carbon compound, with Claims 58, 79, 101, and 123 requiring the carbon compound to promote the reduction of iron oxides.

The Subject Application contains literal support for the presence of a carbon compound in the iron-containing additive and inherent support for the ability of the carbon compound to promote the reduction of iron oxides.

The Subject and Provisional Applications each reference at least one carbon compound that would be understood by one of ordinary skill in the art to promote reduction of iron oxides, such as hematite, magnetite, and wustite, under the thermal conditions of the combustion chamber. Such carbon compounds include hydrocarbons in the coal feed itself (*See e.g.* Subject Application at page 6, lines 7-8 ("coal refers to macromolecular network comprised of groups of polynuclear *aromatic rings* to which are attached subordinate rings connected by oxygen, sulfur and *aliphatic bridges*"); oils and greases (*See e.g.* Subject Application at page 12, lines 14-17 "[t]he additive can also be a sludge containing iron plus oils and greases..."); xanthan gum (*See e.g.* Subject Application at page 13, lines 10-13. "Organic and/or inorganic adhesives can be added to the slurried material to increase the cohesiveness of the material...Laboratory tests have shown that *xantham gum* [a carbon-containing material] lead to very cohesive agents"); and ethylene glycol ($C_2H_6O_2$), which may be added to the iron-bearing material as a flow aid (Provisional Application at page 8 and Subject Application at page 15, lines 1-2).

Moreover, the Subject Application states at page 12, lines 9-12 that "[p]referably, the additive is the collected fines (flue dust...) from the offgas(es) of blast furnace." One skilled in the art would readily appreciate that such fines would contain carbon components. For example, U.S. Patent No. 6,484,651 to Shephard et al. at col. 8, lines 14-16 teaches that "[c]arbon may be present in the iron-bearing materials in the form of, for example, blast furnace flue dust...to promote reduction of the iron oxides to more readily flux the fuel ash." Regarding the carbon compound referenced in Shephard, et al., and the disclosure of such a compound in the Subject and Provisional Applications, the Bisque Declaration states:

> Although the Shepard patent fails to identify the precise carbon compound(s) referenced by this phrase, it states at col. 8, lines 13-16, that "[c]arbon may be present in the iron-bearing materials in the form of, for example, blast furnace flue dust, or carbon may be added to these materials to promote reduction of the iron oxides to more readily flux the fuel ash." *From this sentence, it is my understanding that the carbon referenced in the Shepard patent is in the form of elemental carbon, coke, and/or hydrocarbons.* The Subject and Provisional Applications each reference a number of carbon compounds that would be understood by one of ordinary skill in the art to promote reduction of iron oxides, such as hematite, magnetite, and wustite, under the thermal conditions of the combustion chamber. These compounds include hydrocarbons in the coal feed itself (Provisional Application at page 7 and Subject Application at page 6, lines 6-14); oils and greases (Provisional Application at page 4 and Subject Application at page 12, lines 14-17); xanthum gum (Provisional Application at page 6 and Subject Application at page 13, lines 10-13); and residual hydrocarbons remaining in the boiler slag, which may be added to the iron-bearing material as a flow aid (Provisional Application at page 8 and Subject Application at page 15, lines 1-2). Moreover, as admitted in part by the Shepard patent, iron-oxide reducing carbon compound(s) will be inherently present in the iron-bearing material itself when the iron-bearing material is a byproduct of steel and iron manufacturing, such as Basic Oxygen Furnace or BOF flue dust or precipitator fines, blast furnace flue dust, electric arc furnace dust, and mill scale fines (Provisional Application at page 4 and Subject Application at page 12, lines 7-12, and page 18, lines 13-14).

(Bisque Declaration at ¶10 (emphasis supplied.)

Thus, the Subject Application literally teaches the presence of at least one carbon compound in the iron-bearing material and inherently teaches that the carbon compound can promote the production of iron oxides because flue dust (as taught by the Subject Application) inherently contains at least one carbon compound to promote the production of iron oxides.

<u>The Examiner's assertion that there is no support in the Specification for the requirement that the particle size of the solid fuel be reduced (Claims 52, 59, 73, 80, 95, 102, and 124)</u>.

Claims 52, 59, 73, 80, 95, 102, and 124 require reduction of the particle size of the coal feed.

<u>The Subject Application contains literal and inherent support for crushed solid fuel.</u>

At page 5, lines 16-17, the Specification of the Subject Application states that "[t]he methods and compositions are particularly effective for a cyclone furnace of the type illustrated in Fig. 1." In the Background of the Invention section, at page 1, line 24 to page 2, line 2, the Specification of the Subject Application states in describing the furnace depicted in Fig. 1, that:

> The depicted combuster design is used in a cyclone furnace of the type manufactured by Babcock and Wilcox. Cyclone furnaces operate by maintaining a sticky or viscous later of liquid (melted) ash (or slag) not shown on the inside cylindrical walls 104 of the cyclone combustion chamber 108. <u>*Coal is finely crushed (e.g. to minus 1/4 inch top size)*</u>, entrained in an air stream, and blown into the combustor end 112 of the cyclone combustor or combustor 100 through coal inlet.

(Emphasis added.)

Additionally, the Durham Declaration states:

> I disagree. The Subject Application discloses a "slag type" furnace in which a slag layer forms on a surface of the burner and captures coal particles for combustion. (Subject Application at page 1, lines 21-23) Both the Subject and Provisional Applications disclose a cyclone furnace or boiler *and* wet-bottom boilers as noted in Paragraph 10 above. "Pulverized" coal boilers include both wet-bottom and dry-bottom boilers using a pulverized coal feed. A cyclone boiler is a type of wet-bottom boiler for which the coal feed is crushed but not pulverized. A cyclone boiler is the only type of wet-bottom boiler which uses crushed but not pulverized coal feed. While it is true that pulverizers and crushers are differing types of devices and produce different size distributions of coal feed, the reference to the genus "wet-bottom boilers" would reasonably convey to one skilled in the relevant art that the inventors, at the time the Provisional and Subject Applications were filed, had possession of the subject matter of claim 7.

(Durham Declaration at ¶12).

Thus, a pulverizer is described in the Specification of at least the Subject Application in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time each of the applications was filed, had possession of the claimed invention.

<u>The Examiner's assertion that there is no support in the Specification for the requirements that the ash fusion temperature be less than 2600°F (Claims 66, 88, 110, and 132) and</u>

that the initial deformation temperature, softening temperature, hemispherical temperature, and fluid temperature be less than 2600°F (Claims 66, 88, and 132).

Claims 66, 88, 110, and 132 require that at least one AFT characteristic selected from the group consisting of initial deformation temperature, softening temperature, hemispherical temperature, and fluid temperature be less than 2600°F.

The Provisional Application at page 1 and the Subject Application at page 2, lines 14-15, disclose that ash, in the absence of the iron-containing additive, melts at normal combustion temperatures ranging from 2600 to 3000°F. The Subject Application and the Provisional Application thereafter each state that the iron-bearing additive fluxes the ash and lowers the melting temperature of the ash. *See e.g.* the Subject Application at page 7, lines 15-18 "...it is believed that the presence of iron in the calcium aluminosilicate slags of western coals causes a decrease in the melting temperature of the ash and crystal formation in the melt when a critical temperature (T_{CV}) is reached." As discussed in the Bisque Declaration at ¶¶13 and 16, the AFT characteristics refer to a continuum of ash component melting points with the last (or highest) of the continuum of melting points being the melting temperature of the ash or AFT characteristic fluid temperature.

It follows deductively from the statements in the Provisional and Subject Applications, that the ash, in the absence of the iron-containing additive, melts at temperatures ranging from 2600° F to 3000° F and that the ash melting temperature is reduced by the iron-containing additive, it must follow that the melting temperature or the AFT characteristic fluid temperature of the ash is reduced, and therefore that the AFT characteristics of initial deformation temperature, softening temperature, and hemispherical temperature that are necessarily lower than the fluid temperature, are each less than 2600° F.

The Bisque Declaration further states in ¶22 as follows:

> I disagree. The Provisional Application at page 1 and the Subject Application at page 2, lines 14-15, disclose that the ash (from which the molten slag is formed), in cyclone boilers, must be melted at normal combustion temperatures ranging from 2,600 to 3,000°F. Moreover, the Subject Application at page 20 and in Figure 7 shows that the ash/slag is melted at a temperature below 1,900°F.

Thus, the elements of Claims 66, 88, 110, and 132 are described in the specifications of both the Provisional and Subject Applications in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time each of the applications was filed, had possession of the claimed invention.

The Examiner's Section 112 rejections of claims 33, 68, 90, and 112 due to the lack of support for the iron containing material fluxing the ash slag to produce an ash slag.

As noted above, both the Subject and Provisional Applications teach that the iron-containing additive fluxes the ash slag and lowers the melting and critical temperatures of the ash and the ash viscosity.

Accordingly, Applicants believe that these claims are supported by the Specification.

The Examiner's requirement of explicit disclosure to comply with the written description requirement is unsupported by the law.

MPEP§2163.07(a) states that disclosing a device that inherently performs a function or has a property, operates according to a theory or has an advantage necessarily discloses that function, theory or advantage, *even though it says nothing explicit concerning it."* (Emphasis supplied..) *"The application may later be amended to recite the function, theory, or advantage without introducing prohibited new mater." In re Reynolds,* 443 F.2d 384, 170 USPQ 94 (CCPA 1971); *In re Smythe*, 480 F.2d 1376, 178 USPQ 279 (CCPA 1973).

The Examiner has failed to rebut Applicants' evidence that the Provisional and Subject Applications that, at the time the applications were filed, one of ordinary skill in the art would recognize in the specification disclosure a description of the invention defined by the claims.

"The examiner has the initial burden of presenting evidence or reasoning to explain why persons skilled in the art would not recognize in the original disclosure a description of the

invention defined by the claims." MPEP§2163(I)(B)(3)(b). "The examiner, therefore, must have a reasonable basis to challenge the adequacy of the written description. The examiner has the initial burden of presenting by a preponderance of evidence why a person skilled in the art would not recognize in an applicant's disclosure a description of the invention defined by the claims." MPEP§2163.04. Further, "[u]pon reply by applicant, . . . [the examiner is required to] fully respond to applicant's rebuttal arguments, and properly treat any further showings submitted by applicant in the reply. When a rejection is maintained, any affidavits relevant to the 35 U.S.C. 112, para. 1, written description requirement, must be thoroughly analyzed and discussed in the next Office action." MPEP§2163.02.

At pages 2-3 of the Office Action dated May 1, 2006, the Examiner attempts to rebut Applicants' evidence that a person skilled in the art would recognize in the applicant's disclosure a description of the invention defined by the claims. The Examiner has failed to respond as required by Section 112 to the Applicant's arguments in the Applicant's response dated October 31, 2006.

By way of example, the Examiner, at page 2 of the Office Action mailed May 1, 2006, states:

> Paragraphs 14 and 15 of the Bisque declaration does not appear to support the conclusion that the terms melting point and ash fusion temperature are synonymous. Per the Bisque declaration the fluid temperature (FT) is defined as the temperature at which the ash cone *has melted* to a nearly flat layer with a maximum height of 0.0625 inches and requiring visual observation. This term does not appear to be synonymous with the term melting temperature. Consequently one of ordinary skill would not reasonably conclude that the inventor had possession of the claimed invention.

(Emphasis supplied)

In the final Office Action mailed December 6, 2006, the Examiner further states that "the affidavits were not prepared by disinterested third parties but by interested parties." (Final Office Action at p. 2.)

These paragraphs fail to provide supporting facts in at least two respects.

First, why does it "appear" that the terms melting point and AFT or FT are not synonymous. Apart from the fact that the declarant has stated under oath that this is the case, the Examiner fails to explain his position. Respecting the FT, the Examiner's own definition of FT references the melting point. The definition further requires the ash cone (which has a standard size) to be liquefied. "Melt is defined by *Webster's New World Dictionary* as "to change from a solid to a liquid state, generally by heat". According to the Examiner's own definition, the FT is the temperature at which the last of the ash constituents has melted, or the ash melting temperature.

Second, the Examiner then concludes, without support, that "one of ordinary skill would not reasonably conclude that the inventor had possession of the claimed invention." This conclusion is not only contrary to the conclusions in the Bisque Declaration but also does not follow from the prior sentences. As noted, the Bisque declaration and the Provisional and Subject Applications make clear that the iron-containing additive acts as a fluxing agent, reduces the T_{250} temperature, reduces viscosity, and reduces the ash melting temperature. Even if FT or AFT is not synonymous with ash melting temperature, it still does not follow that the Provisional and Subject Applications do not convey to one of ordinary skill in the art at the time they were filed that the inventor had possession of the claimed invention.

Finally, the dismissal of affidavit evidence simply because it is not from a disinterested party is not a sufficient basis for failing to consider the affidavit. MPEP§716.01(a) states that affidavits or declarations, when timely presented, *must* be considered by the examiner in determining issues of patentability, particularly under 35 U.S.C.§103. MPEP§2163.07(a) states that extrinsic evidence is used to establish inherency and does not require that the extrinsic used to establish compliance of an amendment with the written description requirement be from a disinterested third party.

By way of further example, the Examiner states at page 2 of the Office Action mailed May 1, 2006, as follows:

> Regarding claims 57-58. 78-79, 100-101, and 122-123 the applicants arguments are not persuasive as an individual of ordinary skill in the art would not reasonably conclude that

> the inventor had possession of the claimed invention as an iron bearing material itself does not have carbon as a constituent.

The Examiner further states at page 2 of the Final Office Action that "while many items and materials may possess carbon, there is no mention in the specification of this limitation to allow one of ordinary skill to recognize that this is part of the invention."

These statements fail. The claims have been amended to replace with "iron-bearing" with "iron-containing". Iron-"containing" material means that the material can contain substances other than simply iron. As noted above, both the Subject and Provisional Application make clear that the material can contain other components, including include <u>hydrocarbons in the coal feed itself</u> (*See e.g.* Subject Application at page 6, lines 7-8 ("coal refers to macromolecular network comprised of groups of polynuclear *aromatic rings* to which are attached subordinate rings connected by oxygen, sulfur and *aliphatic bridges*"); <u>oils and greases</u> (*See e.g.* Subject Application at page 12, lines 14-17 "[t]he additive can also be a sludge containing iron plus oils and greases..."); <u>xanthan gum</u> (*See e.g.* Subject Application at page 13, lines 10-13. "Organic and/or inorganic adhesives can be added to the slurried material to increase the cohesiveness of the material...Laboratory tests have shown that *xantham gum* [a carbon-containing material] lead to very cohesive agents"); and <u>ethylene glycol</u> ($C_2H_6O_2$), which may be added to the iron-bearing material as a flow aid (Provisional Application at page 8 and Subject Application at page 15, lines 1-2).

By way of further example, the Examiner states in the May 1 Office Action:

> Regarding claims 52, 59, 80, 95, 102, and 124 an individual of ordinary skill in the art would not reasonably conclude that the inventor had possession of the claimed invention as by applicants own admission as the specification reference to crushed while pulverizing generates a fine powder.

The Examiner further states in the December 6, 2006, Office Action that he does not see in the disclosure any mention of a device for inherently reducing the particle size.

These statements too are flawed. The Subject Application makes clear, as noted above, that the solid fuel has an extremely small particle size. The Durham Declaration further makes clear that the reference to the genus "wet-bottom boilers" would reasonably convey to one skilled

in the art that the inventors, at the time the Provisional and Subject Applications were filed, had possession of the claimed subject matter. Durham Declaration at ¶12. The interchangeable use in Shepard, et al. of "pulverized" and "crushed" provides further support of Applicants'

DISCUSSION OF THE REJECTIONS UNDER 35 U.S.C. §103(a)

The Examiner next rejects claims 68-86, 89-108, 111-130 and 133-139 under 35 U.S.C. §103(a) as being unpatentable over Hepworth (U.S. 4,572,085) in view of Kober (U.S. 4,498,402).

Applicant respectfully traverses the Examiner's rejections. Hepworth fails to teach or suggest at least the following italicized limitations in the rejected independent claims:

> 68. A method of operating a solid fuel fired boiler, comprising:
> introducing a solid fuel into a wet-bottom boiler, *wherein the solid fuel is a low sulfur coal*;
> introducing an iron-containing material into the wet-bottom boiler, wherein the iron-containing material is at least one of mill scale from steel production and dust from blast furnace gas cleaning equipment; and
> at least partially combusting the solid fuel to produce an ash slag, *wherein at least a portion of the iron-containing material fluxes the ash slag to cause the ash slag to have a melting temperature less than the melting temperature of a second ash slag produced from the combustion of the solid fuel alone.*
>
> 90. A method of operating a solid fuel fired boiler, comprising:
> introducing a solid fuel into a wet-bottom boiler, *the solid fuel comprising a low sulfur coal*;
> introducing an iron-containing material into the wet-bottom boiler, wherein the iron-containing material is at least one of mill scale from steel production and dust from blast furnace gas cleaning equipment; and
> at least partially combusting the solid fuel to produce an ash slag, *wherein at least a portion of the iron-containing material fluxes the ash slag to cause the ash slag to have a viscosity in the boiler less than the viscosity in the boiler of a second ash slag produced from the combustion of the solid fuel alone.*
>
> 112. A method of operating a solid fuel fired boiler, comprising:
> introducing a solid fuel into a wet-bottom boiler, *the solid fuel comprising a low sulfur coal*;

introducing an iron-containing material into the wet-bottom boiler, wherein the iron-containing material comprises iron oxides; and

at least partially combusting the solid fuel to produce an ash slag, *wherein at least a portion of the iron-containing material fluxes the ash slag to cause the ash slag to have a viscosity less than a viscosity of a second ash slag produced from the combustion of the solid fuel alone.*

134. A method for operating a slag type furnace, comprising:

introducing a coal-containing fuel into said slag type furnace, *the coal-containing fuel comprising a low sulfur coal*;

introducing an iron-containing additive into the slag type furnace *in an amount sufficient to flux the coal-containing fuel*; and

melting at least a portion of the coal-containing fuel to produce an ash slag, *wherein, in the melting step, at least a portion of the iron-containing additive fluxes the ash slag to produce a slag layer having a melting point less than a melting point of a second slag layer without the iron-containing additive.*

Moreover, no motivation to combine the teachings of Hepworth and Kober can be found in the prior art. To the contrary, both Hepworth and Kober teach away from the combining the references. Indeed, one of skill in the art would have no reasonable expectation of success in combining Hepworth and Kober. Thus, a *prima facie* case of obviousness has not been extablished.

Hepworth is directed to a process for combusting sulfur-containing coal in a single step while producing an off-gas low in sulfur. The process comprises combusting finely divided coal in a furnace burner cavity in the presence of a finely divided iron oxide or iron powder and at least about 60% of the oxygen stoichiometrically required for substantially complete combustion of the coal to form a liquid iron oxysulfide phase and a turbulent atmosphere of combustion-product gases, liquid iron oxysulfide acting to scrub sulfur-containing gaseous species from the atmosphere to yield an essentially sulfur-free flue gas and a liquid iron oxysulfide slag containing substantially the sulfur originally contained in the coal.

The process specifically discloses using fine *high*-sulfur coal and taconite or mill scale in a cyclone furnace to yield an essentially sulfur-free flue gas and a liquid iron oxysulfide slag containing essentially all of the sulfur in the feed coal. Hepworth states that "thermodynamic

efficiency of the desulfurization process is improved since wustite serves as a diluent or solvent for FeS and reduces the H.sub.2 S pressure in equilibrium with the liquid, thereby contributing further to desulfurization of the gas." (Col. 5, lines 17-21.) It further states that:

> With the thermodynamic information available, it became possible to calculate gas compositions at the temperatures of interest. *In the calculation, the effect of carbon on the liquid phase was neglected.* The interaction coefficient is positive, indicating that carbon tends to raise the activity of sulfur. *A beneficial effect of carbon would be to lower the melting point of the liquid and hence increase its fluidity at a given temperature. The beneficial role of silica and other components in reducing the activity of the liquid was also neglected.*

Hepworth is silent about the effect of the iron oxide additive in lowering the melting point of the ash or in increasing slag viscosity. Rather, Hepworth teaches away from this phenomena by stating the carbon, not iron oxide, lowers the melting point of the liquid. Hepworth specifically neglected the beneficial role of "silica and other components in reducing the activity of the liquid".

Although fluxing by the iron additive may occur in the coal combustion process described by Hepworth for specific types of coals, it is far from being certain. Indeed, the only beneficial effect of iron oxide addition explicitly taught by Hepworth is a reduction in sulfur dioxide emissions. Whether iron acts as a flux depends not only on the valence state of the iron but also the composition of the coal. The constituents of coal ash are classed as either basic or acidic. Acidic consituents are silica, alumina, and titania while the basic constituents are iron, calcium, magnesium, and alkalies. As noted at col. 7, lines 21-28, and Fig. 3 of Shepard, et al., a higher ratio of basic constituents indicates lower AFT characteristics or melting point of a fuel and therefore the basic constituents are considered to be the fluxes. For bituminous-type ash, the principle flux, or viscosity lowering, component is Fe_2O_3 while for lignite-type ash the principle fluxes are CaO and MgO. Switching to lower sulfur fuels will cause fuel ash with lower iron contents and lower basicity to be produced in the furnace, resulting in slag and handling problems due to higher than design ash viscosity characteristics. *Id.* at col. 7, lines 51-56.

Because Hepworth is focused on higher sulfur coals, iron-bearing materials, such as mill scale, would not inherently act as a fluxing agent.

Nor is it obvious to modify the Hepworth process to use the low sulfur coal disclosed in Kober. Hepworth states, at col. 1, lines 22-32, as follows:

> Unfortunately, most of the coal supplies in the Eastern and Midwestern United States are *high in sulfur, and substitution of lower-sulfur Western coals therefore is not only expensive because of transportation cost but can cause further distress in the already economically deprived coal-mining areas.*
>
> It is accordingly desirable that economic means be found whereby available *high*-sulfur coals could be utilized without further contributing to the atmospheric pollution problem.

(Emphasis supplied.)

According to Hepworth, the cyclone burner was developed in the 1940's particularly for the purpose of burning high sulfur Illinois coal which has a high ash content and a low ash-fusion temperature. (Hepworth at col. 1, lines 35-38.)

At col. 2, lines 26-37, Hepworth further states:

> Fine *high-sulfur* coal and iron oxide are combusted in a burner cavity such as that of a cyclone furnace using at least about 60% of the oxygen stoichiometrically required for completely combusting said coal to form a liquid iron oxysulfide phase and a turbulent atmosphere of combustion-product gases, with the liquid iron oxysulfide acting to scrub sulfur-containing gaseous species from the furnace atmosphere to yield an essentially sulfur-free flue gas and a liquid iron oxysulfide slag containing essentially all the sulfur contained in the feed coal. Temperature conditions are maintained between about 1100.degree. C. and 1500.degree. C.

As can be seen from the foregoing, the invention of Hepworth is specifically directed to the combustion of high *not* low sulfur coals in cyclone boilers because lower sulfur Western coals are expensive and, if used, can cause further distress in the already economically deprived Eastern coal-mining areas. Hepworth thus *teaches away* from using, in a cyclone boiler, low sulfur coals along with the iron additive of Hepworth. Moreover, because Hepworth teaches only that the iron additive removes sulfur and says nothing about its impact on the melting point or

viscosity of the slag Hepworth provides no incentive or motivation to use low-sulfur coals with the additive in a wet bottom boiler.

Furthermore, Applicant respectfully submits that one of skill in the art would not simply use the low-sulfur coal of Kober with the teaching of Hepworth to meet environmental requirements. As discussed above, this replacement would frustrate the purpose of Hepworth, which is directed to reducing sulfur emissions by forming a liquid iron oxysulfide slag.

Moreover, one of skill in the art would have no reasonable expectation of success in combining the teachings of Hepworth and Kober due to the distinct chemical properties of high and low sulfur coals. It is well known to the skilled artisan that high and low sulfur coals differ not only in sulfur content, but also in ash content, iron content, and levels of magnesium and calcium. These chemical differences make some coals unsuitable for use in certain burners. For example, it is known in the art that the ash content of a coal and the total amount of sulfur compared to the ratio of iron to calcium and magnesium determines whether a coal is suitable for use in a cyclone furnace. Coals with a high iron ratio are unsuitable for use in these furnaces.

Kober also discloses that low-sulfur and high-sulfur coals are not interchangeable in boilers due to the vastly different chemical characteristics. Specifically, Kober states at col. 2, lines 6-15 in reference to switching from high- to low-sulfur coal sources:

> In many cases, these alternate coal supplies are *completely different* from the design coal with regard to ash fusion temperature, ash composition, etc. Substitution of coal with ash characteristics significantly different from those for which a boiler was designed can give rise to problems such as slaggering.

(Emphasis supplied.)

The disclosure of Kober reinforces that known in the art: different coals are not interchangeable due to distinct chemistries. Kober thus teaches away from the combination of Hepworth and Kober, because one of skill in the art would not expect the combination to be successful.

Accordingly, a prima *facie case* of obviousness has not been established. Applicant thus requests that these rejections be withdrawn.

Based upon the foregoing, Applicants believe that all pending claims are in condition for allowance and such disposition is respectfully requested. In the event that a telephone conversation would further prosecution and/or expedite allowance, the Examiner is invited to contact the undersigned.

Respectfully submitted,

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